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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/588,918	08/09/2006	Esther Breuning	14113-00042-US	2477

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EXAMINER	
BOHATY, ANDREW K	
ART UNIT	PAPER NUMBER
1794	

MAIL DATE	DELIVERY MODE
03/01/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/588,918	BREUNING ET AL.	
	Examiner	Art Unit	
	Andrew K. Bohaty	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 October 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7 and 10-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7 and 10-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is in response to the amendment filed October 30, 2009 which amends claims 1, and 7, cancels claims 2-6, 8, and 9. Claims 1, 7, and 10-31 are pending.

Response to Amendment

2. The rejection of claims 6, and 7 under 35 U.S.C. 112, second paragraph, as set forth in the Office action mailed August 7, 2009 is overcome due to claim amendment and claim cancellation.

3. The rejection of claim 19 under 35 U.S.C. 112, second paragraph, as set forth in the Office action mailed August 7, 2009 is withdrawn due to the applicants' remarks on page 6 of the amendment filed October 30, 2009.

4. The rejection of claims 1, 2, 4, 10-14, 18, 19, 21-23, 25-30 under 35 U.S.C. 102(b) as being anticipated by Matsuura et al. (US 2003/0157366) as set forth in the Office action mailed August 7, 2009 is overcome due to claim amendment and claim cancellation.

5. The rejection of claims 1, 2, 4-7, 10, 11, 14, 18, 21-25, 27, and 28 under 35 U.S.C. 102(b) as being anticipated by Sato et al. (US 2003/0218418) as set forth in the Office action mailed August 7, 2009 is overcome due to claim amendment and claim cancellation.

6. The rejection of claims 5-7 and 15-17 under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al. (US 2003/0157366) as set forth in the Office action mailed August 7, 2009 is overcome due to claim amendment and claim cancellation.

7. The rejection of claims 3, 5, 6, 8, and 7 under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al. (US 2003/0157366) in view of Igarashi et al. (US 2002/0048689) as set forth in the Office action mailed August 7, 2009 is overcome due to claim cancellation.

Response to Arguments

8. Applicant's arguments filed October 30, 2009 have been fully considered but they are not persuasive.

9. In response to the applicants' arguments on page 8 and 9, that Igarashi's compound (1-34) does not read on formula (A), the applicants' claim that matrix material A comprises formula (A), therefore, Igarashi's compound (1-34) is a material that comprises triphenylphosphine (reads on applicants' formula (A)) as one of the components of the matrix material A complex. Since the applicants' use the phrase comprising the compound that is matrix material A, can "comprise" other compounds besides compounds that read on applicants' formula (A).

10. Applicant's arguments have been considered but are partially moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claim 20 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

13. Regarding claim 20, the applicants' claim that the matrix material A, which comprises formula (A), itself can emit light from the triplet state. The applicants' do not mention this in the specification, nor do they show this in the preferred examples.

14. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

15. Claim 31 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

16. Regarding claim 31, claim 31 is dependent upon a canceled claim 6. Further, the claim limits Y to be either S or Se and none of the current pending claims has an element Y. The examiner will interpret the claim as previously presented.

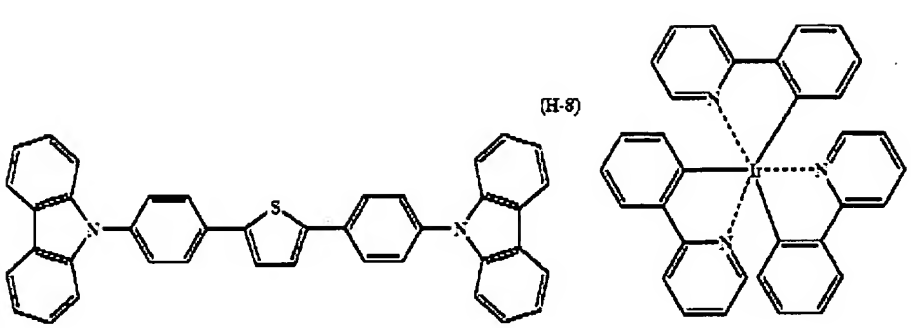
Claim Rejections - 35 USC § 102

17. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

18. Claim 31 rejected under 35 U.S.C. 102(b) as being anticipated by Sato et al. (US 2003/0218418) (hereafter "Sato").

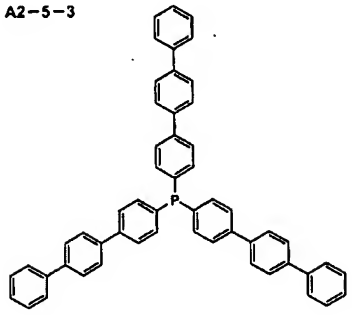
19. Regarding claim 31, Sato discloses an organic electroluminescent device comprising a light-emitting layer sandwich between an anode and cathode, wherein the light-emitting layer comprises a host material (matrix material) and a compound capable of phosphorescence emission (light emission from the triplet state) (abstract). Sato discloses the host as sulfide containing compounds (page 6, compound H-8 (see below), paragraph [0074] and compound H-105, Table 1, paragraph [0122]). The sulfide containing compound, H-8, is a material that contains a main group element (claim 2), S (claim 4), wherein the S is substituted with two aromatic groups. Compound H-8 is a compound of formula (B) where Y is S and Ar is a substituted aromatic ring, more specifically a phenyl ring. Both H-8 and H-105 are uncharged compounds. Although not explicitly disclosed by Sato the sulfide fragment of the molecule of Sato does contain a dipole moment, it is well known in the art that asymmetric compounds, such as sulfides, inherently have dipole moments. The iridium phosphorescent material disclosed by Sato comprises iridium (paragraph [0150], page 30 compound T-2), which as an atomic number of 77.



20. Claims 1, 7, 10-14, and 18-31 are rejected under 35 U.S.C. 102(a) as being anticipated by Fukuda et al. (JP 2004-243298) (hereafter "Fukuda"), where a machine translation is used as the English equivalent. The lengths of the foreign reference and the machine translation are very long so only the relevant portions have been included. The relevant pages of Fukuda et al. (JP 2004-243298) (hereafter "Fukuda") used included are 52-56, 92-100, 537-577 and the relevant pages of the machine translation are 62-70, 130-140, and 887-941.

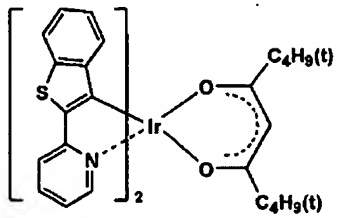
21. Regarding claims 1, 7, 14, 22-28, and 31, Fukuda discloses a light emitting device comprising an anode, a cathode, and a light emitting layer between the cathode and the anode, and the light emitting device can further have an electron transporting layer between the electrodes as well (paragraphs [1043] and [1108]). Fukuda teaches the light emitting layer comprises a host material having the following structure,

A2-5-3

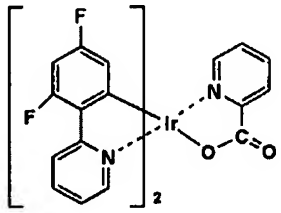


(page 131 of the translation, compound A2-5-3), and phosphorescent materials having the following structures,

Ir-6



Ir-12



(paragraphs [1064], [1066], [1119], and [1121]). Fukuda teaches light emitting layer can comprise two phosphorescent emitting materials (paragraph [1119]). In an example Fukuda discloses that the host material is deposited at a rate of 0.2 A/s and the phosphorescent material is deposited at a rate of 0.05 A/s to form the light emitting layer; therefore, the amount of host material (matrix material A) is 80%, while the amount of the dopant is 20% (paragraph [1116]). While Fukuda uses CBP as the host material in the example this produce is used for the other host materials, which includes A2-5-3.

22. Regarding claims 10 and 11, although it is not directly disclosed by Fukada that the triplet energy of the host compound is between 2 and 4 eV and the triplet energy of the host compound of the sulfide compound is greater than the triplet energy of the iridium phosphorescent material, Fukada does disclose the iridium phosphorescent material can dope the host compound (paragraphs [1108], [1119], and [1120]) and the

iridium phosphorescent material emits green light and it is inherent that if the dopant (phosphorescent material) emits light from the visible spectrum (green light) the host material would have a triplet energy between 2 and 4 eV and the triplet energy would be greater than the triplet energy of the phosphorescent material.

23. Regarding claims 12 and 13, Fukada does not discloses the T_g of the host material (matrix material) in the emitting layer is no less than 100° C; further Fukada does not disclose the host material (matrix material) is amphorous, Matsuura does disclose the material is amphorous, but these materials are compounds of Fukada meet the limitations of applicants' formula (A); therefore, the compounds would inherently have these properties.

24. Regarding claim 18, although not explicitly disclosed by Fukada the phosphorus fragment of the molecule of Fukada does contain a dipole moment, it is well known in the art that asymmetric compounds, such as phosphines, inherently have dipole moments.

25. Regarding claim 19, compound A2-5-3 is a discrete molecular compound.

26. Regarding claim 20, although not explicitly disclosed by Fukada the phosphine compound of Fukada meets the limitations of applicants' formula (A); therefore, the compound would inherently emit light from the triplet state.

27. Regarding claim 21, Fukada discloses the light emitting layer can be formed using vapor deposition (paragraph [1116]).

28. Regarding claim 29, Fukada discloses the light emitting layer can be directly adjacent to the electron transporting layer (paragraph [1043]).

29. Regarding claim 30, Fukada discloses the light emitting layer can be directly adjacent to the anode (paragraph [1043]).

Claim Rejections - 35 USC § 103

30. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

31. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

32. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuda et al. (JP 2004-243298) (hereafter "Fukuda"), where a machine translation is used as the English equivalent, as applied to claims 1, 7, 10-14, and 18-31 above. The lengths of the foreign reference and the machine translation are very long so only the relevant portions have been included. The relevant pages of Fukuda et al. (JP 2004-243298) (hereafter "Fukuda") used included are 52-56, 92-100, 537-577 and the relevant pages of the machine translation are 62-70, 130-140, and 887-941.

33. Regarding claims 15-17, Fukuda does not specifically teach the LUMO and HOMO values of the host (matrix material) and the phosphorescent material.

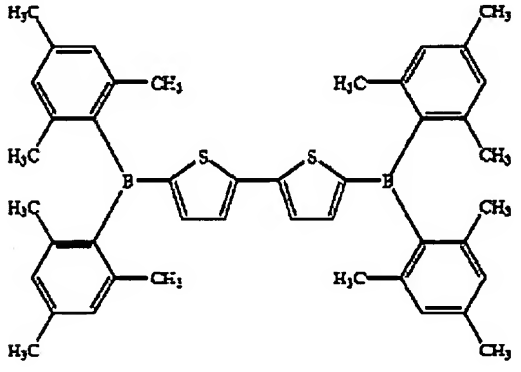
34. Fukuda does teach the use of a phosphorescent dopant in a host material (paragraph [1108]) to obtain an organic electroluminescent element providing high emission luminance and long emission lifetime (paragraph [0015]).

35. It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the HOMO and LUMO values of the host material (matrix material) and phosphorescent material of Fukuda to be characterized in that the LUMO of the host material is higher than the HOMO of the phosphorescent material and the LUMO of the phosphorescent material is higher than the HOMO of the host material; the HOMO of the compound having the less negative HOMO in the emission layer is in the region of ± 0.5 eV of the HOMO of the layer adjacent to the emission layer on the anode side; and that the LUMO of the compound having the more negative LUMO in the emission layer is in the region of ± 0.5 eV of the LUMO of the layer adjacent to the emission layer on the cathode side to further optimize the luminescence properties of the material.

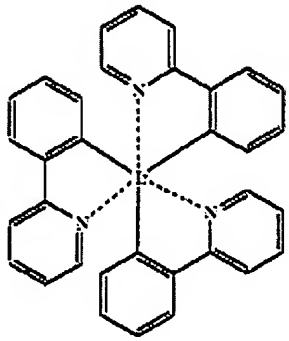
36. Claims 1, 7, and 10-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al. (US 2003/0157366) (hereafter "Matsuura") in view of Igarashi et al. (US 2002/0048689) (hereafter "Igarashi").

37. Regarding claims 1, 14, 18, 19, 20, 22, 23, and 31, Matsuura discloses an organic electroluminescent element (abstract) that contains host compound (matrix

material) (see below) that contains a sulfide (abstract, paragraph [0085], page 8 compound 3-1) and an iridium containing phosphorescent material (see below, compound Ir-1, page 4) (abstract, paragraph [0068]) (claim 1). Although Matsuura does not call the host a matrix material, it performs the same function as the claimed matrix material; therefore, the host compound is also a matrix material. The sulfide compound (matrix material) disclosed by Matsuura comprises a main-group element and is uncharged. The sulfide compound (matrix material) of Matsuura is a non-polymer and a non-salt and Matsuura discloses that the luminescent layer made from the sulfide compound contains higher order structures when the layer is formed (paragraph [0095]). Although not explicitly disclosed by Matsuura the sulfide fragment of the molecule of Matsuura does contain a dipole moment, it is well known in the art that asymmetric compounds, such as sulfides, inherently have dipole moments. The iridium phosphorescent material disclosed by Matsuura comprises iridium (claim 23), which as an atomic number of 77 (claim 22).



(3-1)

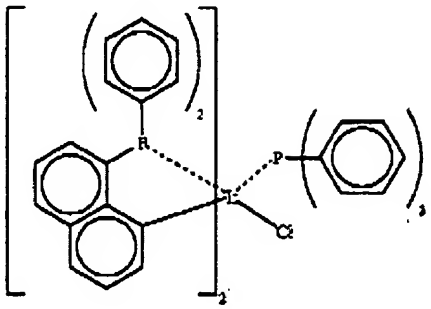


(Ir-1)

38. Matsuura does not teach a host material (matrix material) that comprises phosphorus.

39. Igarashi teaches a light emitting device (abstract) containing an anode (paragraph [0093]) and cathode (paragraph [0097]) and a light emitting layer (abstract), wherein the light emitting layer comprises a phosphorus containing material as a matrix material and can be a host material (abstract, paragraphs [0032]-[0035], and [0042], compound 1-34(see below)). Igarashi teaches the phosphorus material can compose anywhere between 0.1% to 100% by weight of the total light emitting layer (paragraph [0042]) and further teaches the layer can comprise of a plurality of compounds, indicating the phosphorus the number of phosphorus compounds in the layer can be more than one (paragraph [0102]). The compound 1-34 taught by Igarashi is of formula (A) wherein X is P (claim 31) and all the Ars are all phenyl groups (claim 7), unsubstituted aromatic rings (claims 31). The compound 1-34 further comprises Ir, which is a transition metal and these types of materials are known to emit light from the triplet state. Igarashi teaches that the light emitting device can further contain an electron transporting layer, between the anode and the cathode (paragraph [0092]). Igarashi teaches the phosphorus containing compound to provide a light-emitting device with a high efficiency (paragraph [0005]). Although not explicitly disclosed by Igarashi the phosphorus fragment of the molecule of Igarashi does contain a dipole moment, it is well known in the art that asymmetric compounds, such as phosphorus, inherently have dipole moments.

(1-34)



40. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the emission layer of Matsuura to contain the phosphorus containing material (1-34) taught by Igarashi to create a host material (matrix material) that contains phosphorus and three unsubstituted phenyl groups as substituents and a transition metal. The motivation would have been to provide a light-emitting device with a high efficiency.

41. Regarding claims 10 and 11, although it is not directly disclosed by Matsuura that the triplet energy of the host compound is between 2 and 4 eV and the triplet energy of the host compound is greater than the triplet energy of the iridium phosphorescent material, Matsuura does disclose the iridium phosphorescent material can dope the host compound (abstract, paragraphs [0085] and [0068]) and the iridium phosphorescent material emits green light (paragraph [0143]) and it is inherent that if the dopant (phosphorescent material) emits light from the visible spectrum (green light) the host material would have a triplet energy between 2 and 4 eV and the triplet energy would be greater than the triplet energy of the phosphorescent material.

42. Regarding claims 12 and 13, Matsuura discloses the T_g of the host material (matrix material) in the emitting layer is no less than 100° C (paragraph [0102]);

although Matsuura does not disclose the host material (matrix material) is amphorous, Matsuura does disclose the material is thermally stable (paragraph [0102]) it is well known in the art that thermally stable materials are inherently amphorous because crystalline materials are not thermally stable.

43. Regarding claims 15-17, Matsuura does not specifically teach the LUMO and HOMO values of the host (matrix material) and the phosphorescent material.

44. Matsuura does teach the use of a phosphorescent dopant in a host material (abstract) to obtain an organic electroluminescent element providing high emission luminance and long emission lifetime (paragraph [0011]).

45. It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the HOMO and LUMO values of the host material (matrix material) and phosphorescent material of Matsuura to be characterized in that the LUMO of the host material is higher than the HOMO of the phosphorescent material and the LUMO of the phosphorescent material is higher than the HOMO of the host material; the HOMO of the compound having the less negative HOMO in the emission layer is in the region of ± 0.5 eV of the HOMO of the layer adjacent to the emission layer on the anode side; and that the LUMO of the compound having the more negative LUMO in the emission layer is in the region of ± 0.5 eV of the LUMO of the layer adjacent to the emission layer on the cathode side to further optimize the luminescence properties of the material.

46. Regarding claim 21, Matsuura discloses the light emission layer, which includes the host material (matrix material) and phosphorescent material, can be formed as a

thin layer by a vacuum deposition method and a spin-coat method (paragraphs [0095], [0132] and [0133]).

47. Regarding claim 24, Matsuura does not teach that the light emission layer can comprise a mixture of phosphorescent materials.

48. Igarashi teaches that the light emitting layer may be comprised of a plurality of compounds (paragraph [0102]), which means the light emitting layer may comprises of more than one phosphorescent materials (triplet emitters) to provide a light-emitting device with a high efficiency (paragraph [0005]) and ability to produce white light (paragraph [0102]).

49. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify to emission layer of Matsuura to contain a mixture of at least two triplet emitters. The motivation would have been to provide a light-emitting device with a high efficiency and the ability to produce white light.

50. Regarding claims 25 and 26, Matsuura discloses at the light emission layer is formed by a combination of a host material and a phosphorescent material (paragraphs [0138] and [0140], table 1), which are deposited at two different rates (host 0.1 nm/sec, phosphorescent material 0.01 nm/sec) the two material are similar is weight (662.60 g/mol for compound 3-1, table 1, and 654.78 g/mol for Ir-1), so the weight % is about the same of the rate at which the two materials were deposited and in this case the rate as 10:1 host to phosphorescent material meaning the weight % was about 90% (host, matrix material) and 10% phosphorescent material, which is between the amounts claimed in claims 25 and 26).

51. Regarding claims 27 and 28, Matsuura discloses the organic EL element further comprises any of these layers, hole transporting layer and electron transporting layer, in addition to the light emission layer and the anode and cathode (paragraph [0088]).

52. Regarding claims 29 and 30, Matsuura discloses the light emission layer is directly adjacent to the electron-transport layer without the use of a hole-blocking layer and directly adjacent to the anode without use of a hole transporting layer and a hoe injecting layer (paragraph [0092]).

Conclusion

53. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

54. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

55. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

56. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

57. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
Andrew K. Bohaty
Patent Examiner, Art Unit 1794

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1794